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SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

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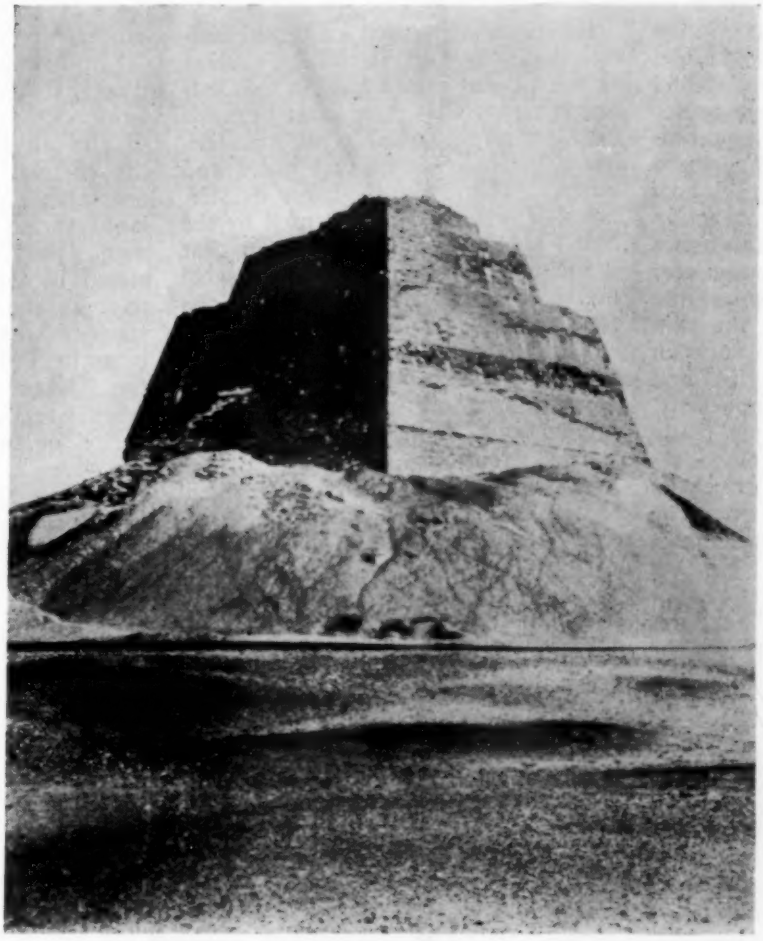

THE GREAT PYRAMID OF MEDUM

Its Secrets are Now Being Probed by an American Expedition

(See page 67)

Vol. XVII No. 460

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Adrenal Extract Combats Cancer

Medicine

THE accidental discovery of two San Francisco doctors that adrenal cortex extract causes disintegration of dangerous and hopeless cancers may prove to be an important addition to weapons of medical science.

So important is this new development in the fight on cancer that the University of California's medical departments and the Hooper Foundation are mobilizing to aid Dr. Walter Bernard Coffey, chief surgeon of the Southern Pacific Hospital in San Francisco, and his assistant, Dr. John D. Humber, in further researches on the promising preparation.

An extract made from the endocrine gland, the adrenal cortex, of sheep was being used by Drs. Coffey and Humber to produce lowered blood pressure, and they noted that it had a disintegrating action upon a tumor in the same subject. In their preliminary report to the San Francisco Pathologic Society they told how they then used the gland extract in the treatment of three hopeless cases of human cancer, one of them cancer of the tonsil. Graduated doses of the extract were injected under the skin and necrosis was caused, to such an extent that the tumors sloughed and the patients were better temporarily.

The new extract is not yet ready for wide use and much more research must be done to discover its applications and limitations. The method of preparation of the extract has not yet been announced by Drs. Coffey and Humber and its composition is not yet known. The adrenals are small organs just above the kidneys.

The work of Dr. Coffey and Dr. Humber is, in effect, a continuation of the line of research reported by Dr. Boris Sokoloff, of the Institute of Cancer Research, Columbia University, New York, who discovered and reported to the International Physiological Congress recently that cancer growths are killed in a few hours by a mixture of adrenal cortex extract, an iron salt and a chemical, pyrrol blue.

Dr. Sokoloff has recently been working at the Institute of Cancer Research at Columbia University and he formerly worked at the Rockefeller Institute for Medical Research.

No human beings have been treated by Dr. Sokoloff's methods, all research being done on animals. He emphasized in his reports that he had not developed a "cancer cure" and that the work was entirely in the experimental stage. When cancerous mice and rats were treated with his preparation the malignant tissue was reduced to a liquid, turned black and finally became hard. The healthy tissue was uninjured and the animals lived for months whereas otherwise they would have died.

His observation that cancerous animals had a sort of fatty degeneration of the adrenal cortex led Dr. Sokoloff to the theory that there must be some kind of physiological connection between malfunction of that gland and cancer. The mixture used by Dr. Sokoloff differs from that used by the San Francisco experimenters in that it includes a chemical that gives off active oxygen which is deadly to the cancer cells.

Further research on treatment of cancer by a mixture containing adrenal cortex extract is being undertaken in St. Louis by Dr. Sokoloff, it was learned from Prof. Leo Loeb of the Washington University Medical School there. Dr. Sokoloff will work in Prof. Loeb's laboratories.

CLOSER cooperation between physician, surgeon, biologist and chemist, which is expected to result ultimately in the solution of the cancer problem, will be established as a result of a gift of $210,000 from an anonymous donor which has just been made to the Cancer Research Fund of the Graduate School of Medicine of the University of Pennsylvania.

Plans for the equipment of a new clinic for modern diagnosis and treatment of tumors in the American Oncologic Hospital are being developed. This cancer hospital will be developed gradually into an anti-cancer center of the most complete character. Joint research has been undertaken with the Bartol Research Foundation of the Franklin Institute, thus securing the cooperation of physicists whose work with radium and X-rays forms such a vital ally to the medical man in his fight against cancer.

"It has been realized for some time that progress in cancer research work depends upon the association of the physician, the biologist and the chemist and upon the close cooperation of related clinics and laboratories," Dr. Josiah H. Penniman, provost of the university, stated in announcing the gift. "Today, as the result of the generous support which has just been given to us by a philanthropist from whom the Cancer Research Fund will receive over $70,000 annually over a period of three years, we have been placed in a position to carry on the cancer research work along these broad cooperative lines to an extent which heretofore was impossible."

At the central laboratories of the Cancer Research Fund there is a complete tissue culture department and an experimental animal cancer department. Research work in radiation is also being carried on there, while at the Philadelphia General Hospital a research laboratory for the study of biochemistry of the blood before and after exposure to radium or X-rays is maintained.

In addition the Cancer Research Fund has made a number of grants for investigations to be carried on by research workers in collaboration with the work of the Fund.

Science News-Letter, February 1, 1930

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Whose Memory Lives In This Egyptian Tomb?

Archæology

Coffin of an Egyptian named Hep-res, who lived about 1200 B. C., taken from the mastabah at Meydum. The coffin is in the form of a bearded mummified man whose face is bright yellow, with features in black. Scenes and vignettes from the Egyptian Book of the Dead are plastered over the figure.

THE great tomb of an unknown Egyptian who lived about 2800 B. C. has been discovered and entered by the expedition from the Museum of the University of Pennsylvania, working at Meydum, fifty miles south of Cairo. A report just received from the director, Alan Rowe, states that the tomb is one of the largest ever found in Egypt, and it is believed that some of the burial chambers have never been plundered.

The site is already producing surprises. The tomb is a mastabah; that is, a construction with sloping sides and flat top, which covered the entrance to the burial chambers beneath. Mr. Rowe states that "after removing the debris from the tops and sides of the huge brick retaining walls, we were astonished to find that these walls were honeycombed with intrusive burials dating from the New Empire, 2000 B. C., or later."

About forty Egyptians had taken over the tomb for a cemetery hundreds of years after the original owner's funeral. These were persons of means, for many of the burials are carefully wrapped mummies lying in rectangular or man-shaped coffins. Some of the coffins are brightly painted with elaborate religious symbols and heiroglyphics.

It was customary in the days of the pyramid-building pharaohs for nobles to place their less monumental tombs close by the king's pyramid. The great mastabah now being cleared is close to the so-called false pyramid of Meydum. The passage into this pyramid is now being cleared by the expedition, and the task is described by Mr. Rowe as being long and arduous. The pyramid in its present damaged state has three receding square stories. Which of the pharaohs built it is not yet certain.

"Meydum is certainly one of the most important sites in Egypt," Mr. Rowe's communication states, "and we are convinced that a thorough exploration of the great pyramid and the surrounding land will produce discoveries of great interest and significance."

ANCIENT Egyptian tourists, who went sightseeing to the tombs of still more ancient kings up the Nile have left the only known clues to the ownership of the pyramid at Meydum. The Egyptian tourists scrawled the name of Snefru no less than five times on the walls of a temple by the pyramid, and it is likely that they knew their history, for Egyptologists today ascribe the pyramid either to the predecessor of Snefru or to Snefru himself, who ruled about 2900 B. C. or a little later.

The pyramid thus dates from the earliest days of pyramid building. The step pyramid of Sakkhara was the first experiment in a mighty towering tomb for royalty, and this great pyramid of Meydum is usually placed third in line in the order of the pyramid-building enterprises. This, too, is in steps, very irregular steps, the second being very steep and the third, now the top tier, being short and broken. Sir Flinders Petrie, British authority on Egyptian antiquities, has concluded that the pyramid was built in seven tiers, and that these were originally filled out in a smooth slope, but that the outer casing was removed by a later pharaoh.

The anxious mental processes of Egypt's kings, which led them to insure their immortality by duplicate tombs, are shown in the case of Snefru. He designed for his last resting place not only apparently the pyramid at Meydum, but also a tomb for his spirit, another pyramid on the desert plains at Dahshur, near the city of Memphis.

Archaeologists who heretofore explored at the Meydum pyramid were successful in finding a sarcophagus chamber beneath the towering structure, but this contained only the fragments of a plain wooden sarcophagus and a wooden vessel, not the sort of trappings which accompanied royalty to the grave even at this early time.

The great age of pyramid building dawned upon Egypt with remarkable suddenness. Not much more than a century after the Egyptians learned to construct stone masonry they were piling up the first pyramid for an ambitious king. That was about 2900 B. C. Thirty years later, the Great Pyramid at Giza, never to be surpassed, was started by Cheops. By 2500 B. C. the pyramid building age had spent itself, though later monarchs did follow the custom of planting ponderous pointed tombs near their royal cities or in the traditional cemeteries of the kings.

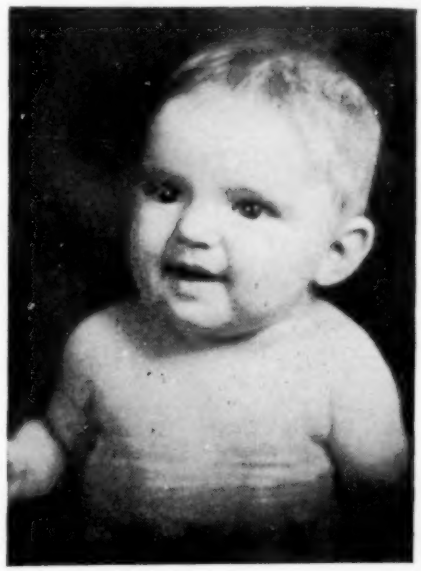
Tutankhamen, whose burial so aroused the world because the splendors had somehow escaped robbers, lived, paradoxically enough, more than a thousand years after the pyramid age when kings of Egypt made the most strenuous efforts in history to pile up formidable secure tombs. Tutankhamen's tomb was a small, hastily built rock sepulchre.

The great pyramid at Meydum has other tombs nearby, of which the mastabah now being excavated is one. Several of these tombs of the king's relations have been excavated in the past and have yielded some of the most beautiful Egyptian art known.

Physician's Test for "Curds and Whey" Finds the Best Milk For Baby's Bottle

Pediatrics

By Marjorie MacDill



This bright-eyed young citizen has been brought up on a diet of soft-curded milk. He is 4½ months old and weighs 19 pounds.

"Little Miss Muffet
She sat on a tuffet
Eating of curds and whey."

HOW many of us have ever personally observed any curds and whey? The country-bred may faintly recall a pan of sour milk on the back of the kitchen stove, from which whey was eventually strained off and curds squeezed out into cottage cheese.

To most, however, the old nursery rhyme calls up idle wonderment about the nature of tuffets and an anticipatory shudder over the onset of the audacious arachnid. The real kick was in the line about the spider. Only a few have speculated over the strange dietetic preferences of Miss Muffet.

One of these, we may suppose, was Dr. Reuben L. Hill, in charge of human nutrition investigations at the Utah Agricultural Experiment Station at Logan, Utah. Whey does not seem to interest him particularly, but curds he has dragged very much into the limelight; and thereby is held out the promise of better days for the world's youngest citizens that have to make a start in life under a bottle handicap.

To date no satisfactory substitute for the food traditionally supposed to be best for babies has ever been invented. The ingenuity of man instrumental in the building of skyscrapers and Zeppelins and radio has never yet succeeded in synthesizing mothers' milk, for lack of which thousands of babies die annually. In a study made by the U. S. Children's Bureau the death rate among bottle babies during the first month of life was three times that of those that were breast-fed.

The principal by-product of the domestic animal described by Stevenson as "the friendly cow, all red and white," is generally conceded to be the best we can do by way of artificial food for the newborn infant. Modern sanitation and pasteurization of cows' milk have greatly enhanced, of course, the chances of the baby deprived of his natural food. Much as these two factors have helped, however, there is still a long way to go before cow's milk can be assimilated with comfort by all the newcomers in a cold world who must depend on it for sustenance.

The new development, sponsored by Dr. Hill, that may come to mean much in the problem of rearing young and delicate babies, is a test that measures the toughness of the curd formed by the normal coagulation of milk. By this means cows' milk can be selected that closely approximates mothers' milk in curd density. Its use in connection with the feeding of sickly and orphaned babies in Utah health centers has been attended with great success.

Certain points, furthermore, have been brought out by the curd test that indicate that some of the factors governing the selection of the contents of baby's bottle in the past, have tended in the wrong direction.

"In selecting a milk for the use of infants," says Dr. Hill, "much attention is usually given to the fat content of the milk and no attention is paid to the protein content, found in the curd, which in reality is far more important than the fat. Nutritionists apparently are not conscious of the fact that the protein content of milk is almost as variable as the fat content, and that between individual cows' milk there is a wide difference in the quantity and quality of the protein or curd content."

It has long been the opinion of many children's specialists and health experts that milk from a herd is advisable for infant feeding because there is less danger of obtaining milk from a diseased cow and the variation in composition is less. Every mother with a baby that has been weaned has learned that the percentage of fat is the criterion by which a choice is made between the output of the dairies in her neighborhood. It is possible that this time-honored procedure may be considerably modified by the principle, advocated by Dr. Hill, of finding the individual cow whose milk is best suited to the digestion of the baby in question, particularly in the case of very young and sickly infants whose care always presents a difficult problem.

Some work in this field, done as far back in 1914, showed the superiority of Holstein and Ayrshire milk over the richer product of Jersey and Guernsey cows, prize butter-fat yielders of the dairy world.

Except for this slight beginning and some curd analyses made in connection with the cheese-making industry in Europe, Dr. Hill has been more or less a pioneer in the field of finding the right milk for tiny babies.

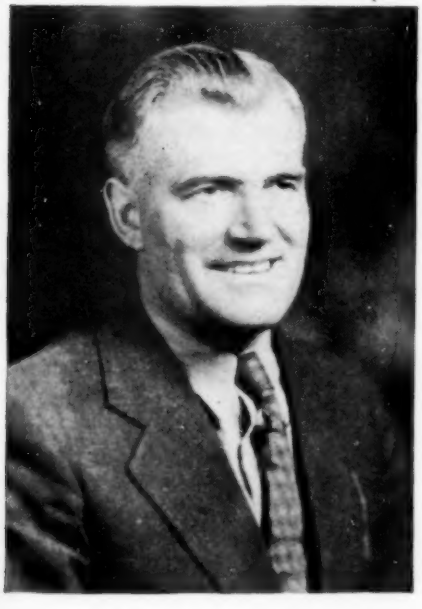
"Comparatively little research," he explains, "has been done on the difference in the digestibility and food value of milks from the different cows for the infant. It is a well-known fact that the curd of cow's

milk forms a tough mass which varies considerably from the soft flaky curd obtained from human milk. That there is a wide variation in the toughness of the curd obtained from the milk of different cows is not generally known. Variation of the toughness of the curd of milk from different cows has been given very little attention in this field of research."

Dr. Hill first began his search to find the true values of different milks as baby food in 1916 when he was on the staff of the Maryland Agricultural Experiment Station. He noticed first that there was a great difference in the curd from different breeds of cattle. These he classified into five groups, grading them in the order of curd texture from those that gave a fine creamy-like curd, most closely approximating that of human milk, to a tough rubbery type. Next he tried to devise some means of measuring mechanically the toughness of these different curds. For this purpose he eventually evolved a star-shaped knife fixed at right angles to a long handle in the center. The knife is drawn up through the curd which it cuts with an upward movement which is much the same principle as that of a cookie cutter cutting down through the dough.

Considerable work was done with the test at this stage of its development. A vast variation in the milks of different breeds and individual cows was noted. The onset of the war in 1918, however, caused the project to be temporarily abandoned.

Work was resumed about a year later at the Utah Agricultural Experiment Station, where a great deal of time was spent in perfecting the test so that fairly uniform results can now be obtained.



Dr. Reuben L. Hill of the Utah Agricultural Experiment Station who developed the test that finds the right milk for the baby's bottle.

Milk should be tested as soon as possible after it is drawn from the cow. Samples are put in glass jars and a small measured quantity of coagulant, the substance that causes milk to separate into curds and whey, is added. This coagulant is a compound of pepsin, the enzyme in human gastric juice that causes milk to curdle in the stomach after it is swallowed. The milk samples are placed in jars, a curd knife having been previously placed in each jar. The coagulant is then added, the milk being gently shaken to secure an even distribution of the coagulant. After the jars have stood about 10 minutes in warm water, the handle of the knife attached to a specially constructed spring balance, a not-too-distant relative of the old fashioned scale on which Grandmother used to weigh her hams and bacon and from which the new baby was suspended in a blanket to see how he tallied up in pounds and ounces. The spring balance of the curd knife measures the amount of tension necessary to draw the knife through the curd and gives the nutrition workers the numerical basis on which to judge its relative toughness in different samples of milk.

The variation in the curd of the milk of different cows was so great, Dr. Hill found, as to be apparent in many cases to the naked eye. The soft curd most suitable for infant feeding can be wrung through a fine-meshed cheesecloth, while hard-curded milk from another cow will resist squeezing and remain a hard rubbery mass inside the cloth.

The test has been applied to the milk of approximately 2,000 cows in different parts of the state of Utah. Only from five to ten per cent. of these gave a soft-curded milk. That is, when milk from these particular cows is coagulated by the processes of digestion in the stomach, it gives a soft curd closely resembling that obtained from human milk. Milk of this type is consequently pre-eminently suitable for baby feeding.

The spring balance shows the pull necessary to draw the curd knife through the coagulated milk in the jar. This is a sample of soft curded milk suitable for babies. The hard curded milk would stretch the balance almost to its limit.

The new technique in baby milk selection met with an enthusiastic response on the part of physicians and nurses all over the state. In one county the test was installed in nine high schools with a trained man to do the testing.

"From a group of over seven thousand infants and small children registered at our conferences," declared Mrs. Evalina Reed, public health nurse of Utah County, "we have a very great number who owe their lives to the fact that a known soft-curded milk, easily digestible, can be secured. Our doctors are very much pleased with this service and feed only soft-curded milk to their delicate feeding cases. I believe it is rapidly solving the difficult problem of infant feeding."

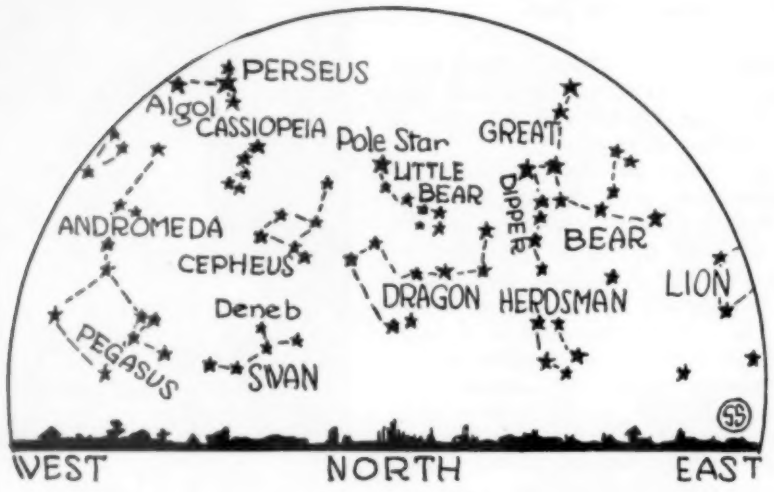
One little baby only nine days old was fed on soft-curded milk from a Holstein cow with no other modification than one-eighth part diluted orange juice. It gained splendidly. Mothers with young hopefuls on formulae, take note.

Cows' milk for the modern baby is usually diluted with water and further modified with additions of sugar and starch in the form of oatmeal or barley gruel. The proportion varies with the age and physical condition of the baby. Mixing this concoction every morning and storing it in bottles in the refrigerator is one of the matutinal tasks of every woman who (*Turn to page* 76)

Brightest Stars Now in Evening Sky

Astronomy

By James Stokley



Hold these maps in front of you and face north or south. The upper or lower one will then show the stars of the February evening sky.

IF you want to see bright stars, this is the time of year to look at evening skies. Of the ten brightest stars that you can see from the United States, seven are now visible in the evening, in and around the constellation of Orion. They form a ring of six brilliant stars, with the seventh near the center.

In the southern sky, these February evenings, you can easily find a row of three stars, which form the belt of the heavenly warrior, Orion. They are not included among the brightest ten, but they form a convenient guidepost to them. Above and to the east of the belt you will see a brilliant star, Betelgeuse. According to Webster, it is pronounced bet'elguz, the first syllable as in "bet", meaning a wager; the second similar to the last syllable of "single" and the "u" in the last the same as in "urn." But you do not need to be surprised if you attend a meeting of astronomers and hear a pronunciation ranging from "beh tell' jew-eez" to "beetle-juice."

Its spelling, too, varies widely, as the last syllable may be spelled "-guese," "-guex" or "-gueze." In fact, many astronomers pronounce the word "alpha Orionis," because this is the really proper way of designating the star, and is subject to fewer variations.

To the southwest of Orion's belt is Rigel, or beta Orionis. To the northwest of Betelgeuse is alpha Tauri, or Aldebaran, to use its common name. This star is red in color, and represents the eye of the bull, Taurus.

This month Taurus is further decorated by the presence of the planet Jupiter, to the north of Aldebaran. Because of its steady light and brilliance superior to any star in the sky, you can easily identify it. Jupiter, of course, is a planet, a member of our own solar system of bodies, that, like the earth, travel in orbits around the sun.

Almost over your head in early February evenings is Capella, in Auriga, the charioteer, about which we shall say more a little later. To the southeast of Capella, and northeast of Betelgeuse, is Pollux, the brighter of the two twins, Gemini. South of Pollux is Procyon, in Canis Minor, the little dog, while still farther south is the brightest of all the stars in the sky, Sirius, the "dog star," in Canis Major, the great dog. In no other part of the sky can so many brilliant stars be seen as in this circle around Orion.

Capella, in Auriga, is the third brightest star visible from 40° north latitude, approximately that of a large part of the United States. Vega, in Lyra, which is not visible this month, is the second brightest. From the extreme southernmost parts of the United States, however, there can be seen a third star that exceeds Capella in brightness. It is Canopus, in the constellation Carina. If you happen to be wintering in Florida or southern California this month, you can see Canopus in the early morning, low in the southern sky.

But though Capella, to the unaided eye, looks like a mere point of light, and though no present or projected telescope, however powerful, will reveal the globe of the star, astronomers have learned many of its secrets. In Prof. A. S. Eddington's famous book, "The Internal Constitution of the Stars," this distinguished astronomer of Cambridge University devotes four pages to listing various facts about Capella. The Astronomical Society of the Pacific, with headquarters in San Francisco, has just issued a leaflet devoted entirely to this star. It was prepared by Dr. Paul W. Merrill, of the Mt. Wilson Observatory, who has himself contributed much of the information.

To the unaided eye, to the same eye looking through a great telescope, or even to the sensitive surface of the photographic plate, Capella looks like a single star. But in 1899 two astronomers, on opposite sides of the Atlantic, found that Capella is not what it seems. Dr. W. W. Campbell, now president of the University of California and director of the Lick Observatory, observed it with the spectroscope. So did Dr. H. F. Newall, at Cambridge University in England.

Identifying the elements of which a distant star consists is not the only work that a spectroscope does for the astronomer. When the light is analyzed and the dark lines of the spectrum appear, they are sometimes displaced towards one end. There are various causes for such a displacement, but the most usual is a motion of the star towards or from the earth—what astronomers refer to as "radial motion," because it is along a radius extending from the earth as a center. It is due to the" Doppler-Fizeau effect."

If you have ever stood on the platform of a railroad station as an express train rushed past with the locomotive bell ringing, you have probably observed a familiar example of this effect. As the bell approaches it sounds shriller than it does when receding. The shrillness, or pitch, of the sound of a bell depends on the distance between the sound waves that reach the ear. The closer they are, or the shorter the wave length, the

more shrill the bell sounds. If the bell emitting the sound waves is rapidly approaching you, the sound waves are jammed closer together than if the bell is standing still, and so it seems to have a higher pitch than normally. When it is rapidly receding, the waves are spread out and then the bell seems to ring with a deeper note.

Since light behaves, for all ordinary purposes, as if it were due to waves, an exactly similar effect is observed. Light from a star approaching the earth is "shriller," or bluer, than light from a star that is stationary with respect to the earth. If the star is receding, it is redder. There are no sharp divisions in the spectrum between the different colors and their displacements cannot be observed, but the sharp dark lines revealed by the spectroscope are different. They can be measured accurately on spectrum photographs. In taking such a spectrum photograph, the spectrum of the star is first recorded. Then, through the same instrument and on the same plate is recorded the spectrum of light from an electric arc of iron or titanium. This produces a series of lines alongside the star spectrum which serves as a standard from which to measure the displacements of the star lines. If the latter then prove to be nearer the red end of the spectrum than the corresponding comparison lines, the astronomer knows that the star is approaching the earth. The speed is indicated by the amount of the displacement.

Studying the spectrum of Capella, Dr. Campbell and Dr. Newall found that the lines varied over a period of about 104 days. The lines would appear as in an ordinary star, then they would double, only to become single again. The only satisfactory explanation of this behavior is that the star is double with the two components revolving around each other. When both members of the pair are on a line with the earth, they are neither approaching nor receding, and their lines coincide. Twenty-six days later they are side by side; then one is moving rapidly towards us, while the other is going away. At this time the lines from the latter are displaced to the red end of the spectrum, while those from the former are shifted to the blue. Therefore, the lines are doubled. After 26 days more the stars are in line and the spectral lines again coincide.

But this is not the only source of our knowledge of Capella. With the interferometer that was used with the 100-inch telescope at Mt. Wilson to measure the first diameter of a star, the actual separate members of the Capella pair were observed. This instrument depends on the fact that the waves in two beams of light, from nearby objects, may be made to "interfere," and produce a series of light and dark bands. Measurement of these bands reveals the separation of the two light sources. The instrument was originally invented by Dr. A. A. Michelson, and modified by Dr. J. A. Anderson for use on the Mt. Wilson telescope. With this instrument, it was found that the angle between the two stars in Capella, when fully separated, is a twentieth of a second of arc. This is the angle that would be made by two points an inch apart and 65 miles from you —too small to be seen directly with any telescope, but not too small to be revealed by the interferometer.

From the observations with the spectroscope, the actual distance separating the two stars was calculated, and found to be 7,866,400,000 miles. With the angle known, and the actual distance between them, it is easy to figure out how far away they are, and this proved to be 52 light years, or 52 times six million million miles! With their distance known, their intrinsic brightness, or "candlepower" was calculated and it turned out that one of them is 110 times and the other 48 times as bright as the sun.

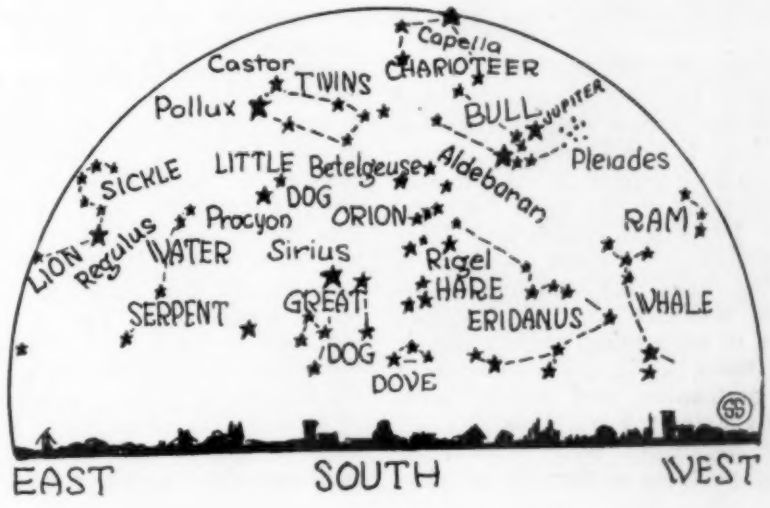
From the known laws of the behavior of glowing bodies, their diameter was estimated at 13.7 and 7 times that of the sun. Study of their motions around each other gives data from which to figure their mass, and the curious fact was found that in this respect they are much more nearly like the sun. The more massive has only 4.2 and the other 3.3 times the sun's mass. As this is spread out over so much more space, they must be exceedingly diffuse. The larger star is about one-four-hundredth as dense as water, not as much as twice that of ordinary air, while the other is only about ten times as dense. This places them in the class of giant stars, while our sun is a dwarf.

Summarizing our knowledge of Capella, Dr. Merrill has this to say:

"Speaking broadly, it is a sun, but it differs markedly from the beneficent ruler of our solar system in many important particulars. To recapitulate briefly, it is a double giant, while our sun is a single dwarf. Both objects are probably typical examples of large classes of similar bodies, unique only in being especially well known to terrestrial observers."

If you look to the southeast of Capella this evening you will see another famous double star. Castor, the fainter of the two Twins, Gemini, and to the northwest of Pollux, is revealed by even a moderate sized telescope as a double star, with two components, one of the second and the other of the third magnitude. They are about 6 seconds apart—120 times as far as the parts of Capella. Being farther apart, they move more slowly, and take about 300 years to make one revolution about each other. But the spectroscope reveals an otherwise unsuspected fact about them. With it, astronomers have shown that each component is itself a spectroscopic binary, like Capella. Even this is not all. About 73 seconds from the center is a faint star that is also part of the system. It also is a spectroscopic binary, so Castor, that you see as single with your unaided eye, consists in reality of six separate orbs, all revolving around each other in a most complicated fashion.

Science News-Letter, February 1, 1930



Parrot Disease

ALTHOUGH parrots are universally kept in Mexico, no proved case of psittacosis has yet been found. Nevertheless, the authorities, aware of the danger that always has existed in a country where pet birds abound, have given attention to domestic bird diseases.

A local parrot disease which is not psittacosis has been reported in the Mexican Biological Review by Dr. Gerardo Varela, bacteriologist of the Mexican Hygenic Institute. While this disease is distinguishable from psittacosis, its occurrence seems to explain the confusion now existing regarding the nature of psittacosis.

Dr. Varela, who has worked in the Rockefeller Institute, the Pasteur Institute of Paris and the Wright Institute in London, stated that he considers the study of every domestic bird disease similar to psittacosis important because of its relation with man. He found that in addition to the organisms of psittacosis and paratyphoid fever with which psittacosis has been confused, the parrot harbors another germ resembling the Bacillus anatum found by Rettger of Germany in ducks in 1918.

The organism found by Dr. Varela will produce disease in parrots, guinea pigs, rabbits, pigeons and ducks. Its existence explains the confusion existing between paratyphoid and psittacosis. These microorganisms belong to the salmonella group. The distinction between the salmonella organisms of human and animal origin is not yet clear, Dr. Varela said. In veterinary medicine the salmonellas cause epidemics that are often attributed to other causes, while in human medicine diseases produced by the salmonella sometimes are classified as enteritis or enterocolitis.

Medicine
Science News-Letter, February 1, 1930

Arsenic in Meteorites

Arsenic, favorite of poisoners, and germanium, a rare element that has been used in the treatment of anemia, are both present in some meteorites that fall to the earth from the skies. Dr. Jacob Papish and Zaida M. Hanford, Cornell University chemists, have just completed a series of analyses of six meteorites. Traces of germanium were found in all of them, while small amounts of both germanium and arsenic were actually extracted from two.

The meteorites were studied by placing portions of them in an electric arc, and studying the light from the arc with a spectroscope. Certain lines, known to be due to germanium, were clearly apparent in all the specimens studied. By a complicated chemical treatment, which started with distillation of hydrochloric acid in which the meteorites had been dissolved, perceptible amounts of arsenic and germanium were extracted from one that fell in Mexico and another that fell in Canada.

Up to the present, the only place outside the earth in which germanium has been located is in the outer layer of the sun, where it has also been found with the aid of the spectroscope. Claims have been made in the past of the identification of arsenic in meteorites, but there has been some controversy about it.

Chemistry—Astronomy
Science News-Letter, February 1, 1930

Gives Credit

To an American, Dr. C. J. Davisson, of the Bell Telephone Laboratories, New York, Prince Louis Victor de Broglie gives a large share of the credit for his Nobel Prize in physics. Many years ago Prince de Broglie announced the theory of wave mechanics which implies that electrons, considered to be tiny particles, act like waves of light or X-rays. With his colleague, Dr. L. H. Germer, Dr. Davisson proved this implication.

In reply to a letter of congratulation from Dr. Davisson, Prince de Broglie wrote: "I know very well that if I have received the Nobel Prize, it is because your splendid research has provided confirmation of the ideas I had developed."

Physics
Science News-Letter, February 1, 1930

Landing at Sea

A new German invention, making it possible to bring a seaplane from the ocean surface to the deck of an ordinary passenger liner with a minimum of danger and inconvenience, is described by Martin Grell in a report to Die Umschau. It consists of a runway of sailcloth which can be unrolled from the stern of the ship and trailed in the water, allowing the plane to climb up on its lower end, whence it is pulled to the deck by a winch. The canvas is kept taut and its lower edge held beneath the water by a suitable drag. With the ship steaming at a reduced speed of from five to seven knots, the runway is rigid enough to support an ordinary plane and five men.

IN VARIOUS CI

The device was constructed because of the recognized need for a safer and more convenient means of contact between plane and ship than the method hitherto in use, of hoisting the floating seaplane aboard by means of a crane. In anything but a dead calm, there has always been the danger of bumping the aircraft against the ship and thereby damaging the one or the other.

The new method will be of use, Herr Grell points out, in sending late consignments of mail after a ship, or to permit a belated passenger to overtake his vessel. It can also be used in case a passenger already on board finds it urgently necessary to return. In the latter case, a plane can be summoned from the shore, taken aboard the ship, and then launched from the catapult on deck.

The North German Lloyd steamer "Lützow" has been fitted with one of the new runways to give it a trial under actual service conditions.

Aviation
Science News-Letter, February 1, 1930

Air Line to Arctic

An 1800 mile air line from Ft. McMurray near Edmonton, Alberta, to Aklavik on the Arctic Ocean has been put in operation.

It is the most northerly air line in the world. Passing over barren wastes and dense forests of the Hudson Bay country its planes travel in one day the distance dog teams often take a month to cover. The route follows the McKenzie river valley.

The planes are equipped with skis during the winter and pontoons will be used in the summer. Caches of gasoline and oil have been put in place along the line of flight. Each plane carries rifles, blankets, provisions and a small gasoline stove for use after possible forced landings.

Aviation
Science News-Letter, February 1, 1930

Ancient Ball Court

A "tlachtli" ball court, the first ever found on the plateau of central Mexico, and like the courts laid out for this sport in the Mayan cities of Yucatan, has been discovered at the ruins of Xochicalco, sixty miles south of Mexico City. The site of the court has just been investigated by Alfonso Caso, director of the Mexican Review of Archaeological and Historical Studies.

SCIENCE FIELDS

A "tlachtli" court was shaped like a long H. The closed court where this popular game was played at Xochicalco was about 235 feet long and 130 feet wide at its greatest dimensions. The structures that enclose the area are in a bad state of ruin. One of the large stone rings through which the ball was thrown has been found by Mr. Caso.

Although early chroniclers mention that the game was played in all the important Mexican cities, this is believed to be the first discovery of a court in the region where the Toltec and Aztec people developed their civilizations.

Xochicalco, which means in Aztec, "place of the flower house," is one of the mystery cities of Mexico. It has been avoided by scientific research parties because it was in one of the worst bandit belts. It has strange subterranean structures of masonry the purpose of which has only been guessed at. Its main temple is noted for a giant plumed serpent of carved stone which undulates its graceful way around the sloping sides of the pyramid base. Nothing is known of the people who built the city, nor of the city's history.

Archaeology
Science News-Letter, February 1, 1930

Mirrored Models

Images of small models and photographic transparencies reflected in a mirror with part of the silvering scratched away are taking the place of huge and costly sets in European movie studios. At a meeting of the Kinematograph Group of the Royal Photographic Society in London, Hans Nieter demonstrated the Schüfftan process of model photography. The method is also being applied in England.

Though models were used in the early days of the movies, it was not possible to photograph human actors easily at the same time. Then methods were tried of using small models in the foreground, close to the camera, while the actors were in the distance. To focus the nearby models and the distant actors at the same time, however, it was necessary to use a very small lens aperture, and this in turn required extra illumination. Somewhat similar was the method used in "Robin Hood", where the upper parts of the castle were painted on glass, and placed in front of the camera in such a way that they appeared to be a continuation of the lower parts, which were actually built.

In the Schüfftan process either transparencies, made from actual photographs, or models can be used. Instead of being in front of the camera, they are placed to the side. A large lens in front of them corrects for their closeness, and a mirror at an angle of 45 degrees reflects their image into the camera lens.

When the directors and technicians have decided on the effect they want, a model or transparency is made in full size, to correspond with the model. This is erected in front of the camera, and enough of the silvering on the mirror is scratched away to show it. Final adjustments make the lines in the set appear as a continuation of those in the model. Then from the point of view of the camera, the set and model merge together imperceptibly. Because of the large correcting lens, everything is in focus, even with the largest aperture camera lenses, so that ordinary lighting can be employed.

In his demonstration Mr. Nieter showed one film of a train dashing over a wrecked bridge into a stream, with the escaping steam rising from the locomotive, and people actually swimming away from the wreck. All the parts of the train were in model form, while the people swam in a tank on the studio floor. Still other effects can be obtained with the use of several mirrors, to show, for instance, the workings of a man's mind, with various thoughts appearing for a time.

The method is particularly advantageous for the talkies, Mr. Nieter pointed out, because it permits the making of scenes in a small compass, and so avoiding the bugbear of echoes on a huge set.

Photography
Science News-Letter, February 1, 1930

Appointment Service

To aid unemployed astronomers to get posts, and to help secure appointees for vacancies, the American Astronomical Society has established an appointment service, Dr. Raymond S. Dugan, secretary of the society, announced. The service will also endeavor to aid graduate students in astronomy to secure fellowships where they can carry on their studies.

Astronomy
Science News-Letter, February 1, 1930

New Instrument

Tracing a continuous record of the intensity of radio broadcast signals, a new instrument will soon be in use to aid the work of Dr. Harlan T. Stetson in studying the relation between sunspots and radio. The instrument is called a "single point recorder," and was designed by Dr. Greenleaf W. Pickard, Massachusetts radio engineer with whom Dr. Stetson has been collaborating.

In announcing the purchase of the new instrument, Dr. Stetson, who is director of the Perkins Observatory of Ohio Wesleyan University, explained that it can follow variations in radio intensity more rapidly than the instrument he used formerly at the Harvard Astronomical Laboratory.

The recorder operates upon the principle of the Wheatstone bridge, used to measure electrical resistance, by balancing the resistance to be tested against one that is known. In the single point recorder, the vacuum tube in the last audio stage of the receiver is placed in the position of the unknown resistance. When the incoming carrier wave changes its resistance, and upsets the electrical balance, a galvanometer needle moves slightly and turns on a motor. The motor adjusts the apparatus until all is balanced again. In doing so, the motor moves the pen which writes the intensity record on a moving sheet of paper.

Radio—Astronomy
Science News-Letter, February 1, 1930

Prismatic Windows

A new type of prismatic window glass, which brings more sunlight to all who live or work in the lower floors of skyscrapers or in adjacent small buildings, has been produced in London.

The new glass is much more efficient than old prismatic panes in deflecting light from its downward course in narrow canyons between buildings to a more horizontal path so that it can better penetrate the interior of rooms, it is claimed.

Tests show that it will permit the passage of approximately 22 per cent. more light than the old panes. It also changes the angle of refraction from approximately 35 degrees to between 55 and 70 degrees from the vertical.

The prisms are large so that the glass can be cleaned easily and their bottom faces are curved to assure abundant and even diffusion of rays.

Engineering—Public Health
Science News-Letter, February 1, 1930

The Contagion of Puerperal Fever
A Classic of Science

Medicine

PUERPERAL FEVER, A Private Pestilence. By Oliver Wendell Holmes. Boston, 1855.

The Contagiousness of Puerperal Fever. Read before the Boston Society for Medical Improvement, Feb. 13, 1843, *and published by request of the society, in the New England Journal of Medicine and Surgery, for April,* 1843.

Originally printed in a journal which was discontinued the following year, this outstanding contribution to the literature of contagion was reprinted unchanged in pamphlet form by its author as a reply to attacks by some of the leading medical authorities of his day. In the pamphlet the original article is prefaced by an introduction in which Holmes says: "I do not know that I shall ever again have so good an opportunity of being useful as was granted me by the raising of the question which produced this Essay. For I have abundant evidence that it has made many practitioners more cautious in their relations with puerperal females, and I have no doubt it will do so still, if it has a chance of being read, though it should call out a hundred counter-blasts, proving to the satisfaction of their authors that it proved nothing. And, for my own part, I had rather rescue one mother from being poisoned by her attendant, than claim to have saved forty out of fifty patients, to whom I had carried the disease."

IN collecting, enforcing and adding to the evidence accumulated upon this most serious subject, I would not be understood to imply that there exists a doubt in the mind of any well-informed member of the medical profession as to the fact that puerperal fever is sometimes communicated from one person to another, both directly and indirectly. In the present state of our knowledge upon this point I should consider such doubts merely as a proof that the sceptic had either not examined the evidence, or, having examined it, refused to accept its plain and unavoidable consequences. I should be sorry to think with Dr. Rigby, that it was a case of 'oblique vision;' I should be unwilling to force home the *argumentum ad hominem* of Dr. Blundell, but I would not consent to make a *question* of a momentous fact, which is no longer to be considered as a subject for trivial discussions, but to be acted upon with silent promptitude. It signifies nothing that wise and experienced practitioners have sometimes doubted the reality of the danger in question; no man has the right to doubt it any longer. No negative facts, no opposing opinions, be they what they may or whose they may, can form any answer to the series of cases now within the reach of all who choose to explore the records of medical science.

If there are some who conceive that any important end would be answered by recording such opinions, or by collecting the history of all the cases they could find in which no evidence of the influence of contagion existed, I believe they are in error. Suppose a few writers of authority can be found to profess a disbelief in contagion—and they are very few compared with those who think differently—is it quite clear that they formed their opinions on a view of all the facts, or is it not apparent that they relied mostly on their own solitary experience? Still further, of those whose names are quoted, is it not true that scarcely a single one could by any possibility have known the half or the tenth of the facts bearing on the subject which have reached such a frightful amount within the last few years? Again, as to the utility of negative facts, as we may briefly call them — instances, namely, in which exposure has not been followed by disease—although, like other truths, they may be worth knowing, I do not see that they are like to shed any important light upon the subject before us. Every such instance requires a good deal of circumstantial explanation before it can be accepted. It is not enough that a practitioner should have had a single case of puerperal fever not followed by others. It must be known whether he attended others while this case was in progress, whether he went directly from one chamber to others, whether he took any, and what precautions. It is important to know that several women were exposed to infection derived from the patient, so that allowance may be made for want of predisposition. Now if of negative facts so sifted there could be accumulated a hundred for every one plain instance of communication here recorded, I trust it need not be said that we are bound to guard and watch over the hundredth tenant of our fold, though the ninety and nine may be sure of escaping the wolf at its entrance. If any one is disposed, then, to take a hundred instances of lives endangered or sacrificed out of those I have mentioned, and make it reasonably clear that within a similar time and compass *ten thousand* escaped the same exposure, I shall thank him for his industry, but I must be permitted to hold to my own practical conclusions, and beg him to adopt or at least to examine them also. Children that walk in calico before open fires are not always burned to death; the instances to the contrary may be worth recording; but by no means if they are to be used as arguments against woollen frocks and high fenders. . . .

The practical point to be illustrated is the following: *The disease known as Puerperal Fever is so far contagious as to be frequently carried from patient to patient by physicians and nurses.* . . .

[There follows a list of cases from English and American medical records..—Ed.]

This long catalogue of melancholy histories assumes a still darker aspect when we remember how kindly nature deals with the parturient female, when she is not immersed in the virulent atmosphere of an improper lying-in hospital, or poisoned in her chamber by the unsuspected breath of contagion. From all causes together, not more than four deaths in a thousand births and miscarriages, happened in England and Wales during the period embraced by the first Report of the Registrar-General. In the second Report the mortality was shown to be about five in one thousand. In the Dublin Lying-in Hospital, during the seven years of Dr. Collins's mastership, there was one case of puerperal fever to 178 deliveries, or less than six to the thousand, and one death from this disease in 278 cases, or between three and four to the thousand. Yet during this period the disease was endemic in the hospital, and might have gone on to rival the horrors of the pestilence of the Maternité, had

not the poison been destroyed by a thorough purification.

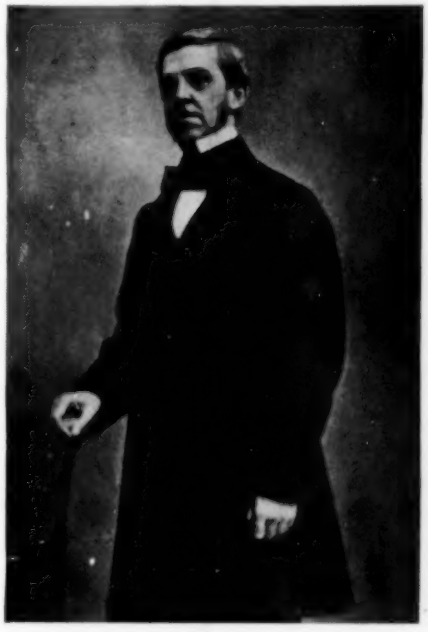
In private practice, having out of view the cases that are to be ascribed to the self-acting system of propagation, it would seem that the disease must be far from common. . . .

IN view of these facts, it does appear a singular coincidence, that one man or woman should have ten, twenty, thirty, or seventy cases of this rare disease, following their footsteps with the keenness of a beagle, through the streets and lanes of a crowded city, while the scores that cross the same paths on the same errands know it only by name. It is a series of similar coincidences that has led us to consider the dagger, the musket, and certain innocent looking white powders, as having some little claim to be regarded as dangerous. It is the practical inattention to similar coincidences that has given rise to the unpleasant but often necessary documents called *indictments*, that has sharpened a form of the cephalotome sometimes employed in the case of adults, and adjusted that modification of the fillet which delivers the world of those who happen to be too much in the way while such striking coincidences are taking place.

I shall now mention a few instances in which the disease appears to have been conveyed by the process of direct inoculation. . . .

[In these and the other case reports cited the transfer of the contagion is obvious in the light of present-day knowledge, while the standards of cleanliness (or lack of it) prevalent among the rank and file of doctors a hundred years ago is revolting to the modern reader.—Ed.]

I have no wish to express any harsh feeling with regard to the painful subject that has come before us. If there are any so far excited by the story of these dreadful events, that they ask for some word of indignant remonstrance, to show that science does not turn the hearts of his followers into ice or stone, let me remind them that such words have been uttered by those who speak with an authority I could not claim. It is as a lesson rather than as a reproach that I call up the memory of these irreparable errors and wrongs. No tongue can tell the heart-breaking calamity they have caused; they have closed the eyes just opened upon a new world of love and happiness; they have bowed the strength of manhood into the dust; they have cast the helplessness of infancy into the stranger's arms, or bequeathed it, with less cruelty, the death of its dying parent. There is no tone deep enough for regret, and no voice loud enough for warning. The woman about to become a mother, or with her new-born infant upon her bosom, should be the object of trembling care and sympathy wherever she bears her tender burden, or stretches her aching limbs. The very outcast of the streets has pity upon her sister in degradation, when the seal of promised maternity is impressed upon her. The remorseless vengeance of the law, brought down upon its victim by a machinery as sure as des-



Oliver Wendell Holmes (1809-1894), distinguished American physician, author and philosopher, from a photograph taken about 1860.

tiny is arrested in its fall at a word which reveals her transient claim for mercy. The solemn prayer of the liturgy singles out her sorrows from the multiplied trials of life, to plead for her in the hour of peril. God forbid that any member of the profession to which she trusts her life, doubly precious at that eventful period, should hazard it negligently, unadvisedly, or selfishly!

There may be some among those whom I address, who are disposed to ask the question, What course are we to follow in relation to this matter? The facts are before them, and the answer must be left to their own judgment and conscience. If any should care to know my own conclusions, they are the following; and in taking the liberty to state them very freely and broadly, I would ask the inquirer to examine them as freely in the light of the evidence which has been laid before him.

1. A physician holding himself in readiness to attend cases of midwifery, should never take any active part in the post-mortem examination of cases of puerperal fever.

2. If a physician is present at such autopsies, he should use thorough ablution, change every article of dress, and allow twenty-four hours or more to elapse before attending to any case of midwifery. It may be well to extend the same caution to cases of simple peritonitis.

3. Similar precautions should be taken after the autopsy or surgical treatment of cases of erysipelas, if the physician is obliged to unite such offices with his obstetrical duties, which is in the highest degree inexpedient.

4. On the occurrence of a single case of puerperal fever in his practice, the physician is bound to consider the next female he attends in labor, unless some weeks, at least, have elapsed, as in danger of being infected by him, and it is his duty to take every precaution to diminish her risk of disease and death.

5. If within a short period two cases of puerperal fever happen close to each other, in the practice of the same physician, the disease not existing or prevailing in the neighborhood, he would do wisely to relinquish his obstetrical practice for at least one month, and endeavor to free himself by every available means from any noxious influence he may carry about with him.

6. The occurrence of three or more closely connected cases, in the practice of one individual, no others existing in the neighborhood, and no other sufficient cause being alleged for the coincidence, is *prima facie* evidence that he is the vehicle of contagion.

7. It is the duty of the physician to take every precaution that the disease shall not be introduced by nurses or other assistants, by making proper inquiries concerning them, and giving timely warning of every suspected source of danger.

8. Whatever indulgence may be granted to those who have heretofore been the ignorant causes of so much misery, the time has come when the existence of a *private pestilence* in the sphere of a single physician should be looked upon not as a misfortune but a crime; and in the knowledge of such occurrences, the duties of the practitioner to his profession, should give way to his paramount obligations to society.

Cosmic Rays May Be Particles

Physics

Germans Find Similarity to Beta and Alpha Rays

THE cosmic rays, penetrating radiations that come into our ken from somewhere outside the solar system, may not be radiated waves at all, results of the latest experiments indicate. In a communication to the German scientific journal Forschungen and Fortschritte, Dr. Walther Bothe of Berlin and Dr. Werner Kolhörster of Potsdam state that they have evidence that the cosmic rays are really high-velocity particles like beta rays, which are free electrons moving at high speed, or possibly like alpha particles, which are the stripped nuclei of hydrogen or helium atoms.

The two German physicists obtained their results with a specially built adaptation of the physical instrument known as the electron counter. It consisted of a cylindrical chamber, within which was a very slender oxidized wire, connected to an electroscope. Whenever a charged particle made contact with the wire the electroscope registered the impact.

Using two of these instruments one above the other within a lead-armored vessel to keep out the earth-originated radiations, Dr. Bothe and Dr. Kolhörster frequently obtained coincidental registrations of particle impacts on their electroscopes. These they regard as having been due, in most cases, to the same particle striking both wires in succession. This would indicate that the particle came from above, with sufficient velocity to carry it through the lead armor and both tubes.

The possibility that cosmic rays may consist of moving particles instead of mere waves of energy is admitted to have radical implications by the two experimenters. To carry such particles through the resistance offered by the earth's atmosphere would require a starting velocity imparted by a potential of at least a billion volts. On the other hand, the total energy of the bombardment that reaches the earth is small, for the measurements indicated only one impact per second for every square centimeter of exposed surface. Considering the almost infinite minuteness of beta or alpha particles, this sinks to almost immeasurably small quantities.

The possibility that cosmic rays may be penetrating particles rather than true radiations receives some support from work done at the U. S. Bureau of Standards by Dr. L. J. Curtis. Dr. Curtis has used a different method from that employed by Dr. Bothe and Dr. Kolhörster. He states that his results lend some support to the opinion of his German colleagues, but he is not yet satisfied that either the German work or his own constitutes full and conclusive proof.

The technical report of Dr. Curtis' experiments will be published in a few weeks by the Bureau of Standards.

Science News-Letter, February 1, 1930

NATURE CAMPS

for

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Illustrated bulletin on request

Professor George R. Green
Director of Nature Camps
STATE COLLEGE, PA.

New Test for Baby's Milk—*Continued*

is responsible for the care of an artificially fed baby under one year.

In many of the bottle formulae in current use, attempts are made to soften the curd in various ways. One authority on infant feeding states that unless raw milk is modified so that hard curds will not be formed in the baby's stomach, the casein in the milk offers serious digestive difficulties not present if it had been previously boiled.

Boiling is probably the most common method of curd modification in general use at the present time. Adding lime water is another method, while oatmeal gruel is said to give a flocculent precipitate that approximates somewhat the curd of human milk. In some cases it is even necessary to take all the curd out of the milk with pepsin and feed the whey.

In spite of all these changes rung on the milk of the honest bossy cow, many babies refuse to thrive.

For such as these, not to mention their mothers and nurses, the use of the curd test, if its continued use gives such gratifying results as it has achieved already, should prove a most beneficent boon. It gives the particular advantage that once the right milk is found it requires little or no modification. This, of course, greatly simplifies the preparation of the daily bottle.

"Milk", declares Dr. Hill, "that tests between 10 and 20 grams is especially suited for infant feeding, and in most cases requires little, if any, modification other than proper sterilization. Milk with a test of from 20 to 30 grams is also suitable, but will probably require more modification to be digested properly by delicate infants. A curd test of from 30 to 50 grams is fair, and when properly modified, milk of this curd hardness can be handled by most infants without difficulty. While enough work has not been done to determine accurately these limits, results obtained to date would indicate that milk with a test above 60 grams will probably cause digestive troubles with the infant, and milk which tests more than 100 grams is almost certain to cause trouble unless the infant is especially robust and the milk is greatly diluted and modified."

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The wage problem in America was present in colonial times when employers and purchasers of goods lamented that labor received higher wages than similar workers abroad.

A large scale attempt to rehabilitate beggars is being made in a Chinese city, where 600 beggars have been officially taken to a new institution and are being taught a trade.

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NATURE RAMBLINGS

By Frank Thone

Linden Seeds

Many of the familiar trees that we know easily enough by name in the summer, when they have leaves and perhaps flowers to help our powers of recognition, are much harder to distinguish in the winter, except for the more or less technically trained observer. One fine friend of the woods, however, is easy to pick out even in January, because of the persistence with which the very peculiar and characteristic seed structures cling to its branches.

The fruits of the linden tree are among the most ingenious of the many kinds of aviation provided by plants for the distribution of their seeds. The seed-bearing stem is flanked on either side by a wide, leaf-like extension that runs out beyond its sharp angle at mid-length, forming the leafy parachute. It still extends its length considerably before branching and terminating in from one or two to six or seven hard, round berries like black peppers. This arrangement throws the center of gravity well below the parachute, and since the branching is always into fairly equal parts the little plane and its burden are well balanced.

The fruits of the linden tree persist through the fall and far into the winter, whirling and buzzing on their stems when the high winds come. Some of them come loose from time to time, and may travel a couple of miles before they drop. And inasmuch as the linden seems to be able to make itself at home fairly well on both bottoms and uplands, the little aviating seeds do not need to worry where their journey ends.

Science News-Letter, February 1, 1930

Because tadpoles react like human beings to poison gas, more than 20,000 tadpoles were used last year by the Chemical Warfare Service in gas tests.

SCIENCE SERVICE RADIO TALKS

Every week a radio talk on science, prepared by Science Service, is given from each of the stations listed below at the times mentioned. Times are in standard time of the locality.

KFMX	NORTHFIELD, MINN.; Carleton College; 1250 kc., 1000 watts. Monday, 11:00 to 11:15 a. m.
KFRU	COLUMBIA, MO.; Stephens College; 630 kc., 500 watts. Tuesday, 5:00 to 5:15 p. m.
KGBU	KETCHIKAN, ALASKA; Alaska Radio and Service Co.; 900 kc., 500 watts. Wednesday or Friday, 7:00 to 7:15 p. m.
KGU	HONOLULU, T. H.; The Honolulu Advertiser; 940 kc., 500 watts. Irregular times.
KOAC	CORVALLIS, ORE.; Oregon State Agricultural College; 560 kc., 1000 watts. Friday, 7:30 to 7:45 p. m.
KOIN	PORTLAND, ORE.; New Heathman Hotel, 490 kc., 1000 watts. Sunday, 4:45 to 5:00 p. m.
KUOA	FAYETTEVILLE, ARK.; Roy E. Burton; 1390 kc., 1000 watts. Monday, 8:30 to 8:45 p. m.
KVOO	TULSA, OKLA.; Southwestern Sales Corporation; 1140 kc., 5000 watts. Monday, Tuesday or Thursday, between 12:45 p. m. and 1:30 p. m.
WCAD	CANTON, N. Y.; St. Lawrence University; 1220 kc., 500 watts. Tuesday, 12:30 to 12:45 p. m.
WCAJ	LINCOLN, NEB.; Nebraska Wesleyan University; 590 kc., 500 watts. Friday, 4:30 to 4:45 p. m.
WDAE	TAMPA, FLA.; Tampa Daily News; 620 kc., 1000 watts. Irregular times.
WEAO	COLUMBUS, O.; Ohio State University; 550 kc., 750 watts. Friday, 12:50 to 1:05 p. m.
WGBF	EVANSVILLE, IND.; Evansville on the Air, Inc.; 630 kc., 500 watts. Sunday, 5:30 to 5:45 p. m.
WGR	BUFFALO, N. Y.; Buffalo Broadcasting Corp.; 550 kc., 1000 watts. Thursday, 6:15 to 6:30 p. m.
WHAS	LOUISVILLE, KY.; Courier-Journal and Louisville Times; 820 kc., 6500 watts. Tuesday, 10:00 to 10:15 a. m.
WHAZ	TROY, N. Y.; Rensselaer Polytechnic Institute; 1300 kc., 500 watts. Monday, between 9:00 and 11:00 p. m.
WHBY	WEST DE PERE, WIS.; St. Norbert College; 1200 kc., 100 watts. Friday, 7:30 to 7:45 p. m.
WHO	DES MOINES, IA.; Bankers Life Co.; 1000 kc., 5000 watts. Tuesday, 11:45 a. m. to 12:00 m.
WJBL	DECATUR, ILL.; Commodore Broadcasting, Inc.; 1200 kc., 100 watts. Wednesday, 7:00 to 7:15 p. m.
WMAL	WASHINGTON, D. C.; M. A. Leese Radio Co.; 630 kc., 250 watts. Thursday, 6:15 to 6:30 p. m.
WMAQ	CHICAGO, ILL.; Chicago Daily News; 670 kc., 5000 watts. Saturday noon or Thursday afternoon.
WSM	NASHVILLE, TENN.; National Life and Accident Insurance Co.; 650 kc., 5000 watts. Wednesday, 5:45 to 6:00 p. m.
WWVA	WHEELING, W. VA.; West Virginia Broadcasting Corp.; 1160 kc., 250 watts. Thursday, 6:00 to 6:15 p. m.

If none of these stations are within reach of your radio set, write to the Program Director of your favorite radio station, suggesting that he add Science Service's radio talks on "Science News of the Week" to his schedule. Full information from

SCIENCE SERVICE
Washington, D. C.

Evolution of the Heavy Diesel Engine

Engineering

Automotive Engineers Review Year's Progress

DIESEL engines weighing less than two pounds per horsepower will be available shortly for aircraft propulsion, O. D. Treiber, of Camden, N. J., predicted to the Society of Automotive Engineers in Detroit last week..

The engineers were gathered from all parts of America and England for their annual four-day session during which they discussed the progress of their industry and aided each other in the solution of common problems.

The present weight of aircraft gasoline engines varies between two and four pounds per horsepower, Mr. Treiber said. That crude-oil-consuming engines, a type which has been built heavy, bulky and slow for years, will soon be made so light and so fast seems hardly possible, but the speaker ably supported his prophecy with a resumé of the recent rapid progress made in the Diesel Field.

The Diesel engine is unlike the ordinary gasoline automobile engine in that it has no ignition system and burns crude oil. Oil is injected into the cylinder under very high pressure and is exploded by the heat of compression.

Diesel engines have been used chiefly for power plants of vessels and electric generating stations. After the World War, the speaker said, Europe, where four-wheel brakes and front-wheel drives were first applied, began to change the heavy and slow Diesel into a lighter engine for service as an economical source of power for motor-coaches and motor trucks.

Engines burning crude oil have already been installed in England's new airship, R-101. Last year an airplane motored by a Packard Diesel made a successful flight from Detroit to Langley Field, Virginia.

Engineers are still reducing the Diesel's weight per horsepower so that its economies of operation can be brought universally to the aircraft field. But the first cost of the Diesel, Mr. Treiber pointed out, will be much greater than that of the gasoline engine.

INTRICATE automobile cylinder blocks are among the most difficult pieces a foundryman has to cast. Usually it is a tedious operation and the mould must be baked dry so that it will not steam and spoil the casting.

But skilful foundrymen have found a way to use "green" or moist sand, except for the inmost cores, and are saving money thereby, the automotive engineers learned from D. J. Campbell, of Muskegon, Michigan.

Molten steel is poured into the hollow image of an engine block with its flanges, cavities, openings and interior passages shaped in flimsy sand. It is very easy for a corner to crumple, for the metal to mash the sand or for the instantly generated steam to tear the mould to pieces.

That is why many moulds are baked—to harden the sand so that it will not crumple and to take its moisture away. Even when green sand is used for the greater part of the mould, the interior is made of baked sand because moisture within instantly converted to steam would be apt to cause a mild explosion.

Present success in using green sand, Mr. Campbell pointed out, is the result of years of studied experience. It will become more useful, he said, if designers and foundrymen cooperate to make the product of a shape that can be more easily moulded.

Power in Cold Mixture

EFFORTLESS starting of automobiles in cold weather and the utilization of more power from gasoline will be realities before long, Carl H. Kindl, of Dayton, Ohio, told the members.

Mr. Kindl reported success with experiments he is conducting which would correct what he calls a "glaring inconsistency" in the application of fuel to the motor.

"It is always true," the engineer said, "that the power of an engine increases as the temperature of the mixture entering the cylinder decreases. With this decrease in temperature it becomes possible to increase compression and thus afford still greater gain in output."

In the experiments satisfactory engine operation was obtained from cold carburetion without the addition of heat to the fuel-air mixture. The intake manifold used provided for the injection of the greater part of the air at the entrance into the cylinder instead of mixing it with the fuel at the carburetor. Of course, freezing temperatures would have little effect on the starting of a car designed to use cold mixtures.

The final satisfactory solution of this problem involves some difficult problems, Mr. Kindl agrees, but he believes that its advantages are so great that it will soon become commercial practice.

Troublesome Boundaries

ALTHOUGH boundaries between states are mere imaginary lines and should be no handicap to unrestricted commerce, motor coach and truck owners are finding many of them as great hindrances to the passage of big vehicles as the network of closely guarded national border lines of Europe.

If existing state laws were fully enforced it would be almost impossible for a large motor vehicle to go from one state into another, Pierre Schon, of Detroit, said.

The state laws which are called serious handicaps to long distance motor transportation are those regulating the height, width and length of vehicles. Tabulations giving the maximum dimensions and weights allowed by law in the 48 states and the District of Columbia reveal the interesting fact that only in two adjacent states can be found a similarity in regulations, namely, California and Arizona.

"In our central states," he continued, "with highly developed interstate commercial transportation, a motor truck complying with the regulations in Indiana cannot enter any of the adjacent states due to variations in weight restrictions."

Trucks more than 12 feet in height operating in the eight states where the height limit is 14 feet 6 inches would not be allowed in the 17 states where the limit is 12 feet. Irregularities affecting length and width were also pointed out.

Mr. Schon did not place the blame for this inconsistency on the legislators. He said: "It is merely a result of lack of interest and cooperation between manufacturers and operators."

This dissimilarity among the many motor truck and coach bodies was also said to be costing both manufacturers and oper- (*Turn to page* 79)

Riots to Understand Einstein Theory

General Science—Journalism

Yet Reporters Wrote About Mob, Not Science

Marlen E. Pew, editor of Editor and Publisher The Fourth Estate, writing in issue of January 18:

A SIGNIFICANT riot occurred recently at the American Museum of Natural History in New York. Police reserves were rushed to the scene when 4,500 persons broke down iron gates and mauled each other to get into a lecture hall to hear a free talk and see a film program arranged by the Amateur Astronomers' Association. The object of the performance was graphically to explain the complicated Einstein theory of relativity which, it has been said, only a half dozen persons in the world are mentally equipped to understand. No one was badly hurt in the scrimmage and no arrest was made.

I have been much interested in editorial comment on this affair. One New York newspaper attributed the riot to the large number of people now living in the metropolis—a crowd might be collected by any sort of attraction. Another comment was that the show was free and naturally brought out a crowd. So far as my observation goes, no one has believed it possible that 4,500 person tried to get into a hall of 1,500 seating capacity because they wanted to see a scientific picture and hear a scientific lecture. This argues that people who go to free shows do not know or care anything about the Einstein theory. Mobs should only be interested in prize-fights, sex magazines, baseball, short skirts and chewing gum, it would appear.

But I think the contrary is true. There is probably more real thought about the theory of the great German-Swiss physicist concerning the fundamental nature of time and space among the type of young folks who battled at the doors of the museum in the park uptown than there is in half a dozen high-toned and heavily subsidized universities in these parts.

The late Edwin E. Slosson, as director of Science Service, once circulated among an indiscriminate group of individuals a questionnaire to determine news preferences in the field of science. It revealed that the overwhelming majority are mainly interested in astronomy and archaeology. Does it surprise newspaper editors that the majority of people are dreaming of the mysteries of the heavens and of prehistoric civilization? I think not, for dull indeed is the mind that does not in some measure react to these interests. In these lively days, when science is so easily available to anyone desiring to study, all kinds of people are satisfying natural curiosity as to the hidden facts of life. The public appetite for information, even about such an abstruse matter as relativity, is insatiable—attested by the ever increasing flood of printed matter dealing with such topics. Yes, I know there is an unconscionable mob concerned primarily with gluttonous and stupid pursuits, but I have in mind the keen-eyed minority of boys and girls and men and women who cannot be overlooked in news coverage. So far as I have seen no New York newspaper gave a description of the Einstein film that 4,500 persons rioted to see, whereas all New York newspapers published stories about the riot itself.

Science News-Letter, February 1, 1930

Ozone Useless For T. B.

Medicine

Low concentrations of ozone are not of much use in treating tuberculosis in guinea pigs, Dr. H. B. McDonnell of the University of Maryland has reported to the Association of Official Agricultural Chemists. Dr. McDonnell's report was based on results of five years of work.

The pigs were inoculated with tuberculosis and given ozone in concentrations ranging from one part per million to one-tenth part per million. The weaker concentrations had little or no effect on either the pigs or the course of the disease. The stronger concentrations did not ameliorate the disease nor did they prolong the lives of the pigs. In fact, the stronger concentrations of ozone seemed to have the opposite effect of shortening the pigs' lives.

Dr. McDonnell said he has not done any work on the effect of ozone on tuberculosis in human beings and has not attempted to apply the results of his work with inoculated guinea pigs to the problem of tuberculosis in men.

Science News-Letter, February 1, 1930

Automotive Meeting—*Continued*

ators millions every year. If a policy of standardization were adopted, manufacturers could make fewer types of bodies on a mass production basis and lower the cost of the product, the speaker declared.

The best effort so far to obtain greater uniformity on legal rulings and restrictions concerning large motor vehicles is the Hoover Code, it was said. This code was formulated in 1925 by the National Conference on Street and Highway Safety. States and cities are gradually modeling their laws after its recommendations.

Feeding the Engine Better

A RADICAL change in automobile carburetion has become widespread during the past three years and has greatly increased engine efficiency, said E. H. Shepard, carburetor engineer.

The substitution of downdraft for updraft carburetion came as soon as the pressure fuel feed system succeeded the vacuum system. Old updraft carburetors had to be below the pressure tank so that gas would run into them. Downdraft carburetors are on top of the intake manifold. From the automobile industry, the new type is now penetrating the marine engine field.

In the updraft carburetor the fuel joins the air stream above the fuel level in the float chamber while in the downdraft unit the venturi opening is below this level. The downdraft carburetor, it has been found, will supply fuel just as the engine requires it much better than the other type. It shows a 10 per cent. increase or better in power between 1,600 and 2,300 revolutions per minute.

More beautiful automobiles will follow the wide adoption of the front wheel drive, Joseph Ledwinka, body designer, predicted to the Society.

The cars of the future will gain beauty largely through decreased overall height, Mr. Ledwinka said. They will be long and graceful.

Science News-Letter, February 1, 1930

FIRST GLANCES AT NEW BOOKS

THE DRIFT OF CIVILIZATION—A Symposium—*Simon and Schuster* ($3). When, late in 1928, the St. Louis Post-Dispatch published its fiftieth anniversary edition, it brought together a list of contributors seldom assembled in one publication. Their comments upon the way the world is going has been brought together in cloth covers in order that they may be more permanently preserved. The future of science is covered in nine articles by: Dr. Charles G. Abbot, Commander Richard E. Byrd, Prof. Albert Einstein, Dr. H. E. Howe, Owen D. Young, Prof. Michael Pupin, Dr. Morris Fishbein, Dr. Paul de Kruif, and Sir Philip Gibbs.

General Science
Science News-Letter, February 1, 1930

CONSUMERS USES OF ARITHMETIC —A. O. Bowen—*Columbia University* ($1.50). The report of a study of what kinds of arithmetic are actually used by adults in their daily life, intended as a guide in curriculum making.

Mathematics
Science News-Letter, February 1, 1930

FORD MODEL "A" CAR—Victor W. Pagé—*Henley* ($2). To the army of mechanics who spend their lives servicing the latest editions from Mr. Ford's factory, this book will be helpful.

Automotive Engineering
Science News-Letter, February 1, 1930

SOME FORERUNNERS OF THE NEWSPAPER—Matthias A. Shaaber—*University of Pennsylvania Press* ($4). To us today to whom the daily newspaper is not a wonder of mechanics and distribution, but simply a necessity, it is difficult to visualize a time when the distribution of printed information depended upon the publication of pamphlets and books. Yet before the appearance of the first English newspaper in the spring of 1622, the journalism of the period of a hundred and sixty years previously consisted of printed ballads, books, advertisements and other miscellaneous printed matter. As today, most of the "journalistic" output was devoted to official news, political and religious propaganda, and accounts of crimes, wars, and rebellions. But it is interesting to read in this scholarly study of the days before the newspaper, accounts of miracles, prodigies, and wonders suggestive of newspaper stories of today.

Journalism
Science News-Letter, February 1, 1930

SKY HIGH—Eric Hodgkins and F. Alexander Magoun—*Little, Brown* ($2.50). Aviation is now old enough to have a history worthy of the name. The stories of the conquest of the air issued in the past few months have been legion. This latest addition to them is a creditable literary job constructed and launched after a careful investigation into the historical facts. Its flight should be long.

Aviation
Science News-Letter, February 1, 1930

THE METROPOLIS OF TOMORROW—Hugh Ferriss—*Ives Washburn* ($7.50). No one who has thought about the future of cities will wish to miss reading and viewing Mr. Ferriss' analyses and predictions, in words and impressive drawings.

Architecture
Science News-Letter, February 1, 1930

HISTORY AND MONUMENTS OF UR —C. J. Gadd—*Dutton* ($4.85). A connected story of a colorful and significant city of the Near East, from the ancient times which are known as a result of the recent excavations, down through the reigns of many kings, and so to the last days of Ur, about the third century B. C. The author is on the staff of the British Museum. He prefaces his book with a statement of interest: "Less than a hundred years ago it would have been impossible to write any history at all of the ancient oriental lands; today a single city in but one of those lands furnishes matter for a volume." Certainly, the reader who follows the career of this single city will have a better idea of the political, racial, and social factors which shaped events in the ancient civilized world.

History
Science News-Letter, February 1, 1930

COLLEGE ORGANIC CHEMISTRY—E. Emmet Reid—*Van Nostrand* ($3.75). As the preface says: "Organic chemistry is a mass of details, an immense collection of facts relative to hundreds of thousands of compounds, yet the relation of these facts to each other is so logical and their sequences so orderly that to understand the system is to remember the whole, as one remembers a cathedral without memorizing the stones of which it is built. Nearly all of the chemistry of carbon compounds can be deduced." And this is a comprehensive text for college use written by a professor of chemistry at Johns Hopkins University.

Chemistry
Science News-Letter, February 1, 1930

AIR LAW REVIEW—*N. Y. University School of Law*—($5). Where men go there the law must follow. As Vol. I, No. 1 of a new periodical, this is a testimonial of the growing importance of the youngest brother of the transportation family.

Law—Aviation
Science News-Letter, February 1, 1930

EXPERIMENTAL RADIO—R. R. Ramsey—*Ramsey Pub. Co.* ($2.75). This is the first edition in printed form of a work that has previously been issued in two mimeographed editions. It is an excellent summary of interesting experiments connected with radio and includes such modern advances as television. Had the book been issued by one of the large publishing houses, they would not have permitted such a serious omission as the lack of an index, which mars an otherwise excellent work.

Radio
Science News-Letter, February 1, 1930

DICTIONARY OF TECHNICAL TERMS —F. S. Crispin—*Bruce Publishing* ($1.25). First aid to students, mechanics, and workmen when they run upon common technical terms used in architecture, wood-working, building, electrical and metal work trades, chemistry, and other technologic arts and sciences.

General Science
Science News-Letter, February 1, 1930

DANCING CATALANS — John Langdon-Davies — *Harper* ($2.50). The Catalans live in a sunny land bordering the Mediterranean, leading a happy, unhurried life, which has changed little in centuries. Mr. Langdon-Davies contrasts them with the Castilians, under whose laws they live, as well as with our modern world.

Ethnology
Science News-Letter, February 1, 1930

A NARRATIVE HISTORY OF AVIATION — John Goldstrom — *Macmillan* ($4). This journalistically written chronicle makes interesting reading. It is a little surprising in the opening paragraph to find the suggestion that some daring man of prehistoric time attempted to fly with a pterodactyl. To place man in the age of the giant reptiles is to make him some forty million years (with a most conservative chronology) earlier than the time at which Dr. Osborn believes preman split with the simian line.

Aviation
Science News-Letter, February 1, 1930

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